Economic evaluation of a crisis resolution service: A randomised controlled trial

PAUL MCCRONE,[1] SONIA JOHNSON,[2] FIONA NOLAN,[3] STEPHEN PILLING,[4] ANDREW SANDOR,[5] JOHN HOULT,[3] NIGEL MCKENZIE,[3] MARIE THOMPSON,[6] PAUL BEBBINGTON[2]

[1]Health Service and Population Research Department, Institute of Psychiatry, King's College London (United Kingdom)
[2]Department of Mental Health Sciences, Royal Free and University College Medical Schools, University College London (United Kingdom)
[3]Camden and Islington Mental Health and Social Care Trust, London (United Kingdom)
[4]CORE (British Psychological Psychology), Sub-Department of Clinical Health Psychology, University College London (United Kingdom)
[5]Central and North West London Mental Health NHS Trust, London (United Kingdom)
[6]Department of Clinical Psychology, University of Surrey, Guildford (United Kingdom)

SUMMARY. **Aims** – The use of specialised services to avoid admission to hospital for people experiencing mental health crises is seen as an integral part of psychiatric services in some countries. The aim of this paper is to assess the impact on costs and cost-effectiveness of a crisis resolution team (CRT). **Methods** – Patients who were experiencing mental health crises sufficient for admission to be considered were randomised to either care provided by a CRT or standard services. The primary outcome measure was inpatient days over a six-month follow-up period. Service use was measured, costs calculated and cost-effectiveness assessed. **Results** – Patients receiving care from the CRT had non-inpatient costs £768 higher than patients receiving standard care (90% CI, £153 to £1375). With the inclusion of inpatient costs the costs for the CRT group were £2438 lower for the CRT group (90% CI, £937 to £3922). If one less day spent as an inpatient was valued at £100, there would be a 99.5% likelihood of the CRT being cost-effective. **Conclusion** – This CRT was shown to be cost-effective for modest values placed on reductions in inpatient stays.
Declaration of Interest: No authors have any interests to declare.

KEY WORDS: costs and cost analysis, community mental health services, crisis intervention, economics.

Received 06.08.2008 – Final version received 24.10.2008 – Accepted 15.10.2008.

INTRODUCTION

Specialised services that aim to avoid admission to hospital for people experiencing mental health crises are now seen as an integral part of psychiatric services in the United Kingdom and elsewhere (Smyth & Hoult, 2000; Johnson, 2004; Department of Health, 2001). Recent figures suggest that in England there are over 200 crisis resolution teams (CRTs) in operation (Durham University, 2004). It has previously been shown that a CRT based in London was effective in reducing rates of admission to hospital and days spent on inpatient wards (Johnson *et al.*, 2005). In addition, there was some evidence that the CRT resulted in better patient satisfaction, but with no significant impact on quality of life or staff ratings of mental health state. Given that there are costs associated with running CRTs and that healthcare resources are limited, it is important to consider the economic impact of such services. The aims of this paper are to assess the impact of the CRT on total service costs and its cost-effectiveness.

METHODS

Setting, sample and study design

The study is described in detail by Johnson *et al.* (2005). It was located in two geographical sectors in the

Address for correspondence: Dr. P. McCrone, P024 Health Service and Population Research Department, Institute of Psychiatry, De Crespigny Park, London SE5 8AF (United Kingdom).
E-mail: p.mccrone@iop.kcl.ac.uk

https://doi.org/10.1017/S1121189X00001469 Published online by Cambridge University Press

London Borough of Islington, an area of high social deprivation and mental health need. The standard care services operating in the area comprised two community mental health teams (with a total of 25 full time and 14 part time staff, excluding medical input), with an average caseload per worker of 17 clients. The teams were linked to two inpatient wards in a small mental health unit attached to the local general hospital. A psychiatric liaison team of six staff was also based in the mental health unit. There were approximately 28 beds allocated to the area. The unit also contained a day hospital for all Islington patients. The area also had 22 beds in two crisis houses.

Patients experiencing a mental health crisis sufficient for mental health professionals to consider admission were referred by community mental health teams to the CRT. Patients were then randomised to receive care either from the CRT or from standard psychiatric services. CRT care augmented usual care and aimed to treat patients at home where possible. Staff were available 24 hours each day. Usual care consisted of inputs from community mental health teams, inpatient units and crisis houses.

Outcomes and costs

Patients were assessed at baseline with information collected on demographic characteristics and clinical history. Admission rates and information on bed days, quality of life, and staff ratings of mental health state were recorded at follow-ups eight and 26 weeks after the index crisis date (Wing *et al.*, 1998; Priebe *et al.*, 1999). We adopted a public payer perspective to costing, but did not include the societal costs of lost employment. Services used during the six months prior to baseline assessment and six-month follow-up were measured using the Client Service Receipt Inventory (Beecham & Knapp, 2001), and included healthcare and social care services, together with contacts with the criminal justice system. These data were collected from patient interviews (where possible) and administrative databases. Where data were missing on the number or duration of contacts, but it was recorded that a service had been used, the median of contacts for other patients was used. If there was no evidence that a service had been used, we assumed it was not. Costs were calculated by combining the service use data with appropriate unit cost information. Most unit costs were obtained from the Personal Social Services Research Unit (Netten & Curtis, 2002; Curtis & Netten, 2004). All costs were expressed in 2003/4 £s. The time horizon was six months and therefore costs were not discounted.

Analysis

Comparisons of service costs including and excluding psychiatric inpatient care were made between the two groups at six-month follow-up, using regression analysis with cost as the dependent variable, and with the group identifier and baseline costs entered as independent variables. The cost data were positively skewed and bootstrapping with 10,000 resamples was therefore used to construct 90% confidence intervals (percentile method) around the cost difference. The rationale for using 90% confidence intervals rather than those at the 95% level is based on an assumption that with economic data, in contrast to clinical data, people are more prepared to make a Type 1 error – rejecting a hypothesis (here of no cost differences) when it is true (McCrone *et al.*, 2004).

The principal aim of the crisis service was to reduce time spent in hospital. As such, the number of days *not* spent on a psychiatric ward during the follow-up period was used as the outcome measure in the cost-effectiveness analysis. Cost-effectiveness was assessed using the net benefit approach, where net benefit is defined as the amount that society would be willing to value an extra unit of outcome (i.e. an inpatient free day) multiplied by the number of units of outcome achieved. From this the costs incurred to achieve the outcome are subtracted. In this case these are the costs of all services *excluding* the psychiatric inpatient costs. We do not know what value society would attach to one less day a patient needs to spend in hospital; it may be equal to the actual cost of that day, but it may also be higher if society takes into account any perceived negative impact of staying in hospital. Conversely, society may not be willing to pay much for a day avoided in hospital if it perceives that patients in the community may pose a risk to themselves or others. Therefore, in the net benefit analysis we used a range of willingness-to-pay figures – £0 to £300 in £25 increments. For each of the subsequent net benefit figures, we compared the two groups using regression analysis. One thousand bootstrap replications were produced for the coefficients of the group variable, and the proportion of these that were over zero indicated the probability that the CRT group was more cost-effective than the standard care group. These probabilities were used to produce a cost-effectiveness acceptability curve.

Results

A total of 260 patients were randomised into the study (135 CRT group, 125 control group). The patients in the

https://doi.org/10.1017/S1121189X00001469 Published online by Cambridge University Press

two groups were similar in terms of age (38.0 years CRT, 37.8 years control), gender (male 48% CRT, 54% control), ethnicity (white 54% CRT, 47% control), marital status (single/widowed/divorced 84% CRT, 83% control), diagnosis (schizophrenia 29% CRT, 30% control; unipolar depression 31% CRT, 30% control; substance misuse 48% CRT, 38% control), and previous admissions (69% CRT, 71% control). Further details of the sample are provided by Johnson *et al.* (5). Inpatient costs could be calculated for all but the one patient (randomised to the CRT group) for whom data were missing. Total service costs could not initially be calculated for 17 patients (8 CRT, 9 control) as it was not known whether some services had been used. The unknown costs for 16 of these were coded as zero and combined with the complete data services. Total costs were not computed for one person as the number of days they had been admitted for was unknown.

Table I provides details of service utilisation and costs. In both groups and at both time points, most participants had seen their GP, while around half had seen a psychiatrist (aside from psychiatric contacts as part of the CRT intervention). About half the sample were also in contact with a case manager (social worker/community mental health nurse). Day care services were used by around one quarter of the sample, and a similar proportion had contacts with the police and accident and emergency departments for psychiatric reasons. For those in the CRT group, the vast majority actually had contact with a CRT worker and about half had contact with a CRT psychiatrist. A small number of patients in the control group had CRT contacts.

The mean cost of services, excluding psychiatric inpatient care, was £768 higher in the CRT group, a difference which was statistically significant (90% CI, £153 to £1375). However, this difference was more than offset by reduced costs of inpatient care as mean total costs at follow-up were £2438 lower in the CRT group after adjusting for baseline costs (90% CI, £937 to £3922). Although we decided to use 90% CIs, the costs difference was also statistically significant with a 99% level of confidence. Psychiatric inpatient costs accounted for 29% of the costs for the CRT group in the six months prior to baseline. This increased to 45% at follow-up. The figures for the standard care group were 35% and 68% respectively. Within the CRT group, the actual CRT inputs accounted for 11% of total follow-up costs.

The cost-effectiveness acceptability curve (Figure 1) reveals that services provided to the CRT group would have less than a 10% likelihood of being more cost-effective than those provided to the standard care group if society were did not value a day avoided in hospital at all. However, if the societal value were £25 for this outcome then the likelihood of cost-effectiveness rises to 41%. Beyond a value of £100 it appears that the care provided to the CRT group is almost certain to be cost-effective.

DISCUSSION

The main finding of this paper is that, compared to standard care, the CRT resulted in reduced inpatient costs that more than offset the costs of the CRT intervention itself. Whilst costs will only be saved if beds are closed, even if they were not, the CRT would enable the system to work more efficiently. It is of interest that in the area where the CRT was introduced an assertive community treatment team was also established, but this did not result in reduced admissions (Killaspy *et al.*, 2008; 2006).

If we assume that society does place some value on patients being able to avoid admission, and if this value is around £100 per day, the CRT is clearly cost-effective. This value is reasonable, given that the actual cost of an inpatient day is far in excess of £100 and that patients in the CRT group did not have worse clinical outcomes than those receiving standard care services.

The study was limited in that some service use data were collected from patients and recall may have been limited. On the other hand, data collected from hospital records may have been incomplete. In addition, this economic evaluation uses inpatient use as an outcome measure. This was appropriate, as the aim of the CRT was to reduce bed use. However, inpatient care is also a service input and in other areas the outcome measure would be a clinically specific one (such as symptomatology) or generic (e.g. quality-adjusted life years). Johnson et al do report that clinical measures were generally (or though not significantly) better for the experimental group (Johnson *et al.*, 2005), which adds to the argument that the CRT intervention was cost-effective.

In conclusion, this study showed that a CRT was cost-effective for modest values placed on reductions in inpatient stays. To establish these teams requires investment of funds that could be used in other areas of mental health care (for example providing more beds) or indeed in other clinical areas (e.g. cancer, diabetes, etc). It is therefore important to demonstrate that expenditure on crisis teams represents an efficient use of resources and this cost-effectiveness analysis has shown that this is likely to be the case.

https://doi.org/10.1017/S1121189X00001469 Published online by Cambridge University Press

https://doi.org/10.1017/S1121189X00001469 Published online by Cambridge University Press

Table I – *Service use and costs in six months prior to baseline and follow-up interview.*

	Baseline						Follow-up					
	CRT group			Standard care group			CRT group			Standard care group		
	N (%) users	Mean (sd) contacts by users	Mean (sd) cost across group	N (%) users	Mean (sd) contacts by users	Mean (sd) cost across group	N (%) users	Mean (sd) contacts by users	Mean (sd) cost across group	N (%) users	Mean (sd) contacts by users	Mean (sd) cost across group
Crisis team	–	–	–	–	–	–	127 (94)	16.3 (21.4)	596 (706)	3 (2)	5.0 (4.0)	5 (33)
Crisis team psychiatrist	–	–	–	–	–	–	73 (54)	2.3 (1.7)	117 (160)	2 (2)	6.0 (5.7)	9 (87)
Psychiatric inpatient[1]	21 (16)	29.2 (22.1)	782 (2346)	25 (20)	37.2 (39.5)	1278 (3942)	39 (29)	55.2 (49.5)	2765 (6282)	84 (67)	52.1 (50.2)	6024 (8236)
Other inpatient[1]	17 (13)	5.8 (6.6)	217 (891)	10 (8)	7.9 (8.7)	189 (951)	12 (9)	10.8 (18.3)	288 (1821)	11 (9)	13.0 (15.1)	342 (1693)
Residential care	17 (13)	–	437 (1377)	27 (22)	–	947 (2203)	18 (13)	–	502 (1498)	22 (18)	–	623 (1665)
Crisis house	12 (9)	18.3 (8.4)	238 (843)	8 (6)	12.8 (8.1)	120 (540)	34 (25)	20.2 (16.5)	754 (1773)	22 (18)	20.3 (12.7)	525 (1375)
Drug/alcohol rehabilitation	–	–	–	–	–	–	2 (2)	34.5 (19.1)	51 (447)	4 (3)	57.8 (57.2)	185 (1347)
GP	120 (89)	4.5 (4.6)	118 (206)	96 (77)	3.2 (2.1)	69 (73)	116 (88)	3.9 (2.5)	79 (71)	88 (74)	3.5 (2.6)	60 (67)
Psychiatrist	59 (44)	1.8 (0.9)	98 (152)	58 (46)	1.7 (0.8)	90 (138)	75 (56)	1.7 (1.2)	169 (224)	69 (56)	1.8 (2.6)	182 (236)
Other doctor	22 (16)	1.7 (1.0)	15 (42)	10 (8)	1.4 (0.7)	7 (29)	18 (13)	1.6 (1.0)	14 (46)	20 (16)	1.8 (1.0)	16 (46)
Psychologist	8 (6)	4.3 (6.5)	17 (123)	8 (6)	3.9 (2.9)	16 (75)	13 (10)	3.0 (2.8)	19 (84)	9 (7)	4.2 (4.2)	21 (106)
Drug/alcohol advisor	8 (6)	28.8 (51.6)	9 (55)	11 (9)	5.8 (4.8)	10 (41)	12 (9)	12.5 (17.9)	19 (105)	13 (11)	8.4 (10.0)	17 (88)
Counsellor	10 (7)	18.6 (36.0)	38 (290)	10 (8)	12.0 (10.4)	29 (133)	17 (13)	10.3 (24.2)	38 (251)	8 (7)	14.1 (15.6)	25 (143)
Duty team	13 (10)	2.0 (1.5)	10 (34)	12 (10)	1.6 (1.2)	8 (29)	15 (11)	7.0 (15.5)	36 (234)	24 (20)	3.6 (3.9)	32 (99)
Case manager	65 (48)	8.1 (5.0)	221 (335)	58 (46)	12.6 (13.7)	253 (428)	74 (55)	11.1 (8.0)	344 (528)	69 (56)	12.6 (12.6)	347 (529)
Day care	34 (25)	41.1 (45.2)	199 (719)	27 (22)	35.9 (41.8)	109 (482)	38 (28)	30.1 (29.9)	122 (342)	33 (27)	34.6 (36.8)	135 (480)
A&E (psychiatric reasons)	36 (27)	1.7 (1.8)	39 (105)	35 (28)	2.5 (2.4)	61 (148)	33 (24)	2.9 (2.8)	61 (160)	39 (32)	2.2 (2.3)	60 (144)
A&E (other reasons)	23 (17)	1.6 (1.2)	23 (67)	19 (15)	2.2 (2.7)	29 (113)	22 (16)	1.3 (0.5)	19 (46)	24 (19)	1.5 (0.9)	25 (62)
Prison[1]	1 (1)	21.0 (–)	10 (118)	2 (2)	25.5 (17.7)	27 (233)	1 (1)	2.0 (–)	1 (11)	0 (0)	–	0 (0)
Police cell[1]	6 (4)	1.3 (0.8)	4 (22)	6 (5)	2.3 (3.3)	8 (58)	6 (4)	1.3 (0.8)	4 (22)	3 (2)	1.7 (1.2)	3 (21)
Police	34 (25)	2.2 (2.1)	8 (20)	29 (23)	2.1 (1.8)	7 (18)	39 (29)	2.2 (2.5)	9 (24)	26 (21)	1.4 (0.6)	4 (9)
Other	16 (12)	14.9 (13.0)	80 (346)	21 (17)	22.8 (28.1)	278 (1901)	18 (13)	15.6 (9.7)	49 (157)	19 (15)	29.3 (34.0)	155 (979)
Other mental health	35 (26)	13.6 (32.0)	151 (735)	38 (30)	6.0 (7.2)	78 (206)	45 (33)	10.2 (19.4)	146 (518)	44 (35)	7.9 (10.3)	119 (306)
Total excl. psychiatric inpatient			1933 (2630)			2331 (3336)			3439 (3578)			2869 (3106)
Total incl. psychiatric inpatient			2715 (3510)			3610 (5080)			6204 (6748)			8893 (7891)

Costs are in 2003/4 £s;[1] service contacts = length of stay
Individual costs do not sum exactly to the totals because the latter were computed by recoding individual service costs that were missing to zero

[1]The figures for individual services in the table do not make the assumption of a zero cost when the value was missing. However, as described above, we did make this assumption to compute the totals. Therefore, the individual costs do not sum exactly to the totals.

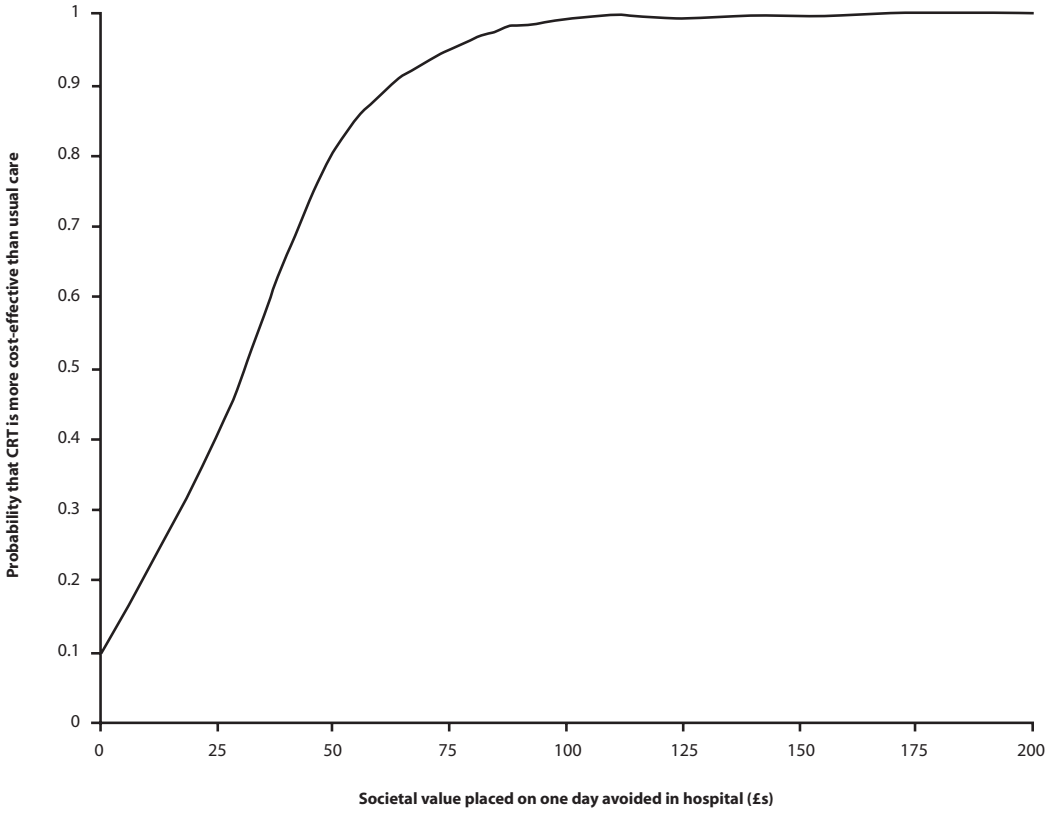


Figure 1. – *Cost-effectiveness acceptability curve.*

Acknowledgement. Camden and Islington Health Authority and the Department of Health. The contributors are independent of these bodies, except that several of us have contracts with a Mental Health Trust whose services were commissioned by Camden and Islington Health Authority. Ethics approval was awarded by Camden and Islington community research ethics committee (reference 00/23).

REFERENCES

Beecham J. & Knapp M. (2001). Costing psychiatric interventions. In *Measuring Mental Health Needs*. 2nd ed. (ed. G. Thornicroft), pp. 200-224. Gaskell: London.

Curtis L. & Netten A. (2004). *Unit Costs of Health and Social Care*. Personal Social Services Research Unit, University of Kent: Canterbury.

Department of Health (2001). *Mental Health Policy Implementation Guide*. Department of Health: London.

Durham University (2004). *Adult Mental Health Service Mapping*. Retrieved August 6, 2008, from http://www.amhmapping.org.uk/reports/live.php

Johnson S. (2004). Crisis resolution and home treatment teams. *Psychiatry* 3, 22-25.

Johnson S., Nolan F., Pilling S., Sandor A., Hoult J., McKenzie N., White I.R., Thompson M. & Bebbington P. (2005). Randomised controlled trial of acute mental health care by a specialist crisis team: the north Islington crisis study. *British Medical Journal* 331, 599-602.

Killaspy H., Bebbington P., Blizard R., Johnson S., Nolan F., Pilling S. & King M. (2006). The REACT study: Randomised evaluation of assertive community treatment in north London. *British Medical Journal* 332, 815-820.

Killaspy H., Johnson S., King M. & Bebbington P. (2008). Developing mental health services in response to research evidence. *Epidemiologia e Psichiatria Sociale* 17, 47-56.

McCrone P., Ridsdale L., Darbishire L. & Seed P. (2004). Cost-effectiveness of cognitive behavioural therapy, graded exercise and usual care for patients with chronic fatigue in primary care. *Psychological Medicine* 34, 991-999.

Netten A. & Curtis L. (2002). *Unit Costs of Health and Social Care*. Personal Social Services Research Unit, University of Kent: Canterbury.

Priebe S., Huxley P., Knight S. & Evans S. (1999). Application and results of the Manchester short assessment of quality of life. *International Journal of Social Psychiatry* 45, 7-12.

Smyth M.G. & Hoult J. (2000). The home treatment enigma. *British Medical Journal* 320, 305-308.

Wing J.K., Beevor A.S., Curtis R.H., Park S.B., Hadden S. & Burns A. (1998). Health of the Nation Outcomes Scales (HoNOS). Research and Development. *British Journal of Psychiatry* 172, 11-18.

https://doi.org/10.1017/S1121189X00001469 Published online by Cambridge University Press